

2016 DAM AND DIKE INSPECTION REPORT CCR PONDS COMPLEX

GERs-16-168

**OKLAUNION POWER STATION
VERNON, TEXAS**

**PREPARED BY
AEP SERVICE CORPORATION
CIVIL ENGINEERING DIVISION
GEOTECHNICAL ENGINEERING SECTION
1 RIVERSIDE PLAZA
COLUMBUS, OHIO**

DAM & DIKE INSPECTION REPORT
Oklaunion Power Station
CCR Ponds Complex

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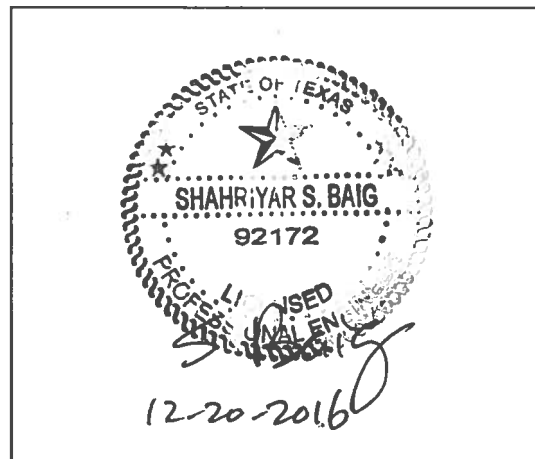
OKLAUNION POWER STATION
VERNON, TX

INSPECTION DATE November 1,2 & 3, 2016

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INTRODUCTION

American Electric Power Service Corporation's (AEPSC) Civil Engineering Division administers the Oklaunion Power Station Dam Inspection and Maintenance Program (DIMP). As part of the DIMP, staff from the Geotechnical Engineering Services Section periodically conducts dam and dike inspections. The 2016 inspection of the wastewater pond complex at Oklaunion Station was performed by Ms. Leilah Saadi E.I.T. and Mr. Brian Palmer, P.E. of AEPSC Civil Engineering. This report presents a summary of the inspection and an assessment of the condition of the facilities.

The inspection was performed on November 1st, 2nd and 3rd, 2016. Mr. Peter A. Civitarese, energy production superintendent was the plant contact and accompanied Ms. Leilah Saadi and Mr. Brian Palmer during the inspection. Weather conditions on November 1-3 were mostly sunny with good visibility, temperatures in the mid to high 70's. Inspection observations were briefly discussed with Plant Manager Monte McMahan, Maintenance Supervisor Nick Lee, Plant Environmental Coordinator Pat Hunter and Mr. Civitarese after completion of the field work.

General Facility Information

The Oklaunion Power Station is owned by American Electric Power and is located at 12567 FM Rd 3430, Vernon, TX 76384. The plant is a coal-fired facility, which includes a number of wastewater evaporation ponds containing cooling tower blowdown. Five of the ponds are used to manage coal combustion residuals and other wastewater treatment solids.

Coal combustion by-products are sluiced to the ponds until they are sufficiently dry to be hauled away and landfilled or beneficially used. The five CCR surface impoundments referenced as Ponds 6, 21, 22, 23 and the Waste Water and Sludge Pond, with a total area of 104.1 acres. A general site plan showing the ponds are provided in Appendix A.

All of the dikes are homogeneous earthen embankments having side slopes of 3H:1V, crest elevation at 1215 ft, and crest widths varying between 20 ft -22 ft. The following table is a summary of current CCR unit water levels; water volume and CCR volume based on measurements taken in November 2016 and throughout the calendar year.

	Pond 6	Pond 21	Pond 22	Pond 23	WWSP
Approximate Minimum depth of impounded water since last annual inspection	15ft (1200)	18ft (1208)	14ft (1204)	14ft (1208)	10ft (1200)
Approximate Maximum depth of impounded water since last annual inspection	28ft (1213)	23ft (1213)	23ft (1213)	23ft (1213)	23ft (1213)
Approximate Present depth of impounded water at the time of the inspection	28ft (1213)	23ft (1213)	23ft (1213)	23ft (1213)	23ft (1213)
Approximate Minimum depth of CCR since last annual inspection	23ft (1208)	22ft (1212)	21ft (1211)	25ft (1215)	22ft (1212)
Approximate Maximum depth of CCR since last annual inspection	29ft (1214)	22ft (1212)	22ft (1212)	26ft (1216)	24ft (1214)
Approximate Present depth of CCR at the time of the inspection	29ft (1214)	22ft (1212)	22ft (1212)	26ft (1216)	24ft (1214)
Storage Capacity of impounding structure at the time of the inspection	1100acre-ft	125acre-ft	125acre-ft	250 acre-ft	400 acre-ft
Approximate volume of impounded water at the time of the inspection	220 acre-ft	65acre-ft	55acre-ft	120 acre-ft	80 acre-ft
Approximate volume of CCR at the time of the inspection	880 acre-ft	45acre-ft	55acre-ft	125 acre-ft	320 acre-ft

Note: 20ft(1214) – Depth (Elevation)

SUMMARY OF VISUAL OBSERVATIONS

The summary of the visual observations uses terms to describe the general appearance or condition of an observed item, activity or structure. The meaning of these terms is as follows:

Good:	A condition or activity that is generally better or slightly better than what is minimally expected or anticipated from a design or maintenance point of view.
Fair/Satisfactory:	A condition or activity that generally meets what is minimally expected or anticipated from a design or maintenance point of view.
Poor:	A condition or activity that is generally below what is minimally expected or anticipated from a design or maintenance point of view.
Minor:	A reference to an observed item (e.g. erosion, seepage, vegetation, etc.) where the current maintenance condition is below what is normal or desired, but which is not currently causing concern from a structure safety or stability point of view.
Significant:	A reference to an observed item (e.g. erosion, seepage, vegetation, cracks, concrete surface etc.) where the current maintenance program has neglected to improve the condition. Usually, conditions that have been identified in previous inspections, but have not been corrected.
Excessive:	A reference to an observed item (e.g., erosion, seepage, vegetation, cracks, concrete surface etc.) where the current maintenance condition is above or worse than what is normal or desired, and which may have affected the ability of the observer to properly evaluate the structure or particular area being observed or which may be a concern from a structure safety or stability point of view.

Results of the visual inspection performed in November 2016 are summarized below with inspection photographs included in Appendix B. The inspection focused on the CCR ponds located within the evaporation pond complex at Oklaunion Power Station (see general site plan in Appendix A.)

Pond 6 - Wastewater Evaporation Pond

Pond #6 is located at the south-central edge of the main evaporation pond complex area. In 2015, Pond 6 dam embankment was raised to provide additional ash storage capacity. The crest elevation was raised from Elevation 1208 to Elevation 1215 feet.

The crest of the embankment appeared to be in good condition with no unusual cracking, rutting, settlement, deformation, or misalignment. (Observation 1, Photos 1-4)

The exterior slopes of the south and west dikes were in overall good condition (Observation 2, Photos #1-2). No signs of slope failure, slumping, or seepage were observed on the downstream slopes and no burrowing animal activity was noted. The slopes were adequately vegetated and no erosional features were noted. All slopes were free of woody vegetation.

The eastern slope of Pond #6 is also the western slope of the Pond #7 spillway discharge channel. The channel was in fair condition. The spillway of the adjacent Pond #7 has been substantially blocked and no discharge can occur. However, the discharge channel below, shown in Observation 2, Photo #3 and #4, also receives runoff from the surrounding area and should be monitored for erosion as part of the periodic visual inspections.

Pond 21 – Bottom Ash Pond A

The slopes of Pond 21 are in good condition. Pond 21 is an incised 5.1 acre bottom ash pond. The only visible dike portions are 3-5 ft above the normal pool levels. During the inspection there was some erosion damage was noticed on the interior slope of the Makeup Water Pond which is the exterior slope of Pond 21, see Observation 3, Photo #4. The plant will continue to monitor the exterior slope until the repair is performed.

Overall, Pond 21 appeared in good, stable and functional condition and there were no visual observations to indicate any structural deficiencies that would impact the integrity of the dikes. Observation 3 and 4 Photos #1-4 provide views of various components of the Pond 21 from the 2016 inspection. The geometry of the dike has not changed or altered since the last inspection.

Pond 22 - Bottom Ash Pond B

The slopes of Pond 22 are in good condition. Pond 22 is an incised 5.1 acre pond originally designed for storing bottom ash. The only visible dike portions of the pond are 3-5 ft above the normal pool levels. Based on the inspection there were no visual observations to indicate any structural deficiencies that would impact the integrity of the dikes. Observation 5, Photos #1-4 provide views of various components of the Pond 22 from the 2016 inspection. The geometry of the dike has not changed or altered since the last inspection.

Pond 23 – Fly Ash Pond

The slopes of Pond 23 are in good condition. Pond 23 is an incised 13.3 acre pond originally designed to contain fly ash. The only visible dike portions of the pond are 3-5ft above the normal pool levels. Based on the inspection there were no visual observations to indicate any structural deficiencies that would impact the integrity of the dikes. Observation 6, Photos #1-4 provide views of various components of the Pond 23 from the 2016 inspection. The geometry of the dike has not changed or altered since the last inspection.

Waste Water Sludge Pond

The slopes of the Waste Water and Sludge Pond (WWSP) are in good condition. WWSP is an incised 22.6 acre pond. The only visible dike portions are 3-5 ft above the normal pool levels. Based on the inspection there were no visual observations to indicate any structural deficiencies that would impact the integrity of the dikes. Observation 7, Photos #1-4 provide views of various components of the Pond WWSP from the 2016 inspection. The geometry of the dike has not changed or altered since the last inspection.

REVIEW OF AVAILABLE INFORMATION

A review of available information regarding the status and condition of the CCR Ponds, which include files available in the CCR operating record, such as design and construction information, periodic structural stability assessments, previous 7 day inspection reports, 30-day instrumentation data, and previous annual inspections has been conducted. Based on the review of the data there were no signs of actual or potential structural weakness or adverse conditions.

ASSESSMENT OF RECENT INSTRUMENTATION DATA

Five piezometers (B-1, B-3, B-4, B-5, and B-6) were installed in July 2016 around the Pond 21, 22, 23 and WWSP. Each piezometer was installed at the crest surrounding the ponds. See the piezometer location map located in Appendix A. Figure-1 shows the static water levels of those piezometers and ponds pool levels measured during monthly plant inspections beginning in August, 2016. All of the ponds (#21, 22, 23, and WWSP) pool level were found to be consistent at an elevation 1,213 feet. During a short period from monthly measurement data, the static water levels in the piezometers have indicated some fluctuations. In the future, it is expected that the readings will normalize producing consistent static water levels. The current readings fall below the average pool levels (1,213 ft.) of each pond and will continue to be monitored. Should the readings fall above the pool level, plant maintenance is to contact AEP Civil Engineering Services and further analysis will be conducted. The current readings and their anticipated patterns do not show a threat to the stability of the slopes, and meets the requirements of the Factor of Safety limits provided by the CCR rules.

Piezometers (B-1502A, B1513, B-1506A, B-1507A, B-1508A, and B1412) were installed in various locations along the crest of Pond 6 after raising the dikes in 2015. See the Piezometer Location map located in Appendix A. The chart located in Figure-2 shows the static water levels of those piezometers measured during monthly plant inspections, along with the measured pool levels of Pond 6. All of the piezometers indicated static water levels below the pond pool level (1,213 feet). All piezometers indicated static water levels within expected tolerance except B-1508A. Piezometer B-

1508A indicated about 5-foot increase in the water level since 8/2016. This increase in the static water shall be monitored for at least next 6 months for further evaluation.

CONCLUSIONS

The CCR Ponds appears to be operating as designed and shows no signs of distress, slope instability, dike misalignment or settlement. Based on the visual inspection, the overall condition of the CCR Ponds at Oklaunion Power Station is good. Inspection and monitoring activities being performed by the Plant and AEPSC Civil Engineering & Geotechnical Services should continue.

RECOMENDATIONS

Following are remedial actions and monitoring requirements that are recommended as a result of the inspection. Assistance or guidance with the implementation of these items can be provided by AEPSC Civil Engineering & Geotechnical Services:

- Drainage along the toe of Pond 6 east exterior dike is considered fair and requires visual inspections of the area to continue with the weekly/monthly inspections.
- Vegetation management for the facility is considered good. Grassed areas should continue to be mowed regularly. Any areas that are not accessible to mowing equipment should be controlled by the use of weed trimmers, power brush cutters, or other suitable vegetation control method.
- Plant inspection and monitoring procedures, maintenance activities, and reporting with respect to the dikes should be implemented in coordination with AEP Civil Engineering.
- The exterior slope of Pond 21 (the interior slope of the Make-Up Water Pond) is to be visually inspected periodically. Should further erosion occur the plant will take preventative actions by installing rip rap along the eroded area in order to protect slope.
- Piezometer B-1508A shall be monitored monthly for at least next 6 months for further evaluation due to the increase in water levels since 8/2016.
- Piezometers B-1, B-3, B-4, B-5, and B-6 surrounding Ponds 21, 22, 23 and the WWSP shall continue to be monitored monthly and AEP Civil Engineering services to be immediately notified should the piezometer readings shift above pool levels.

If you have any questions with regard to this report, please contact Brian Palmer at 614-716-3382 (audinet 200-3382) or Leilah Saadi at 614-716-2254 (audinet 200-2254).

FIGURES

FIGURE - 1
CCR Ponds Piezometer Data
Pond 21, Pond 22, Pond 23 and WWSP

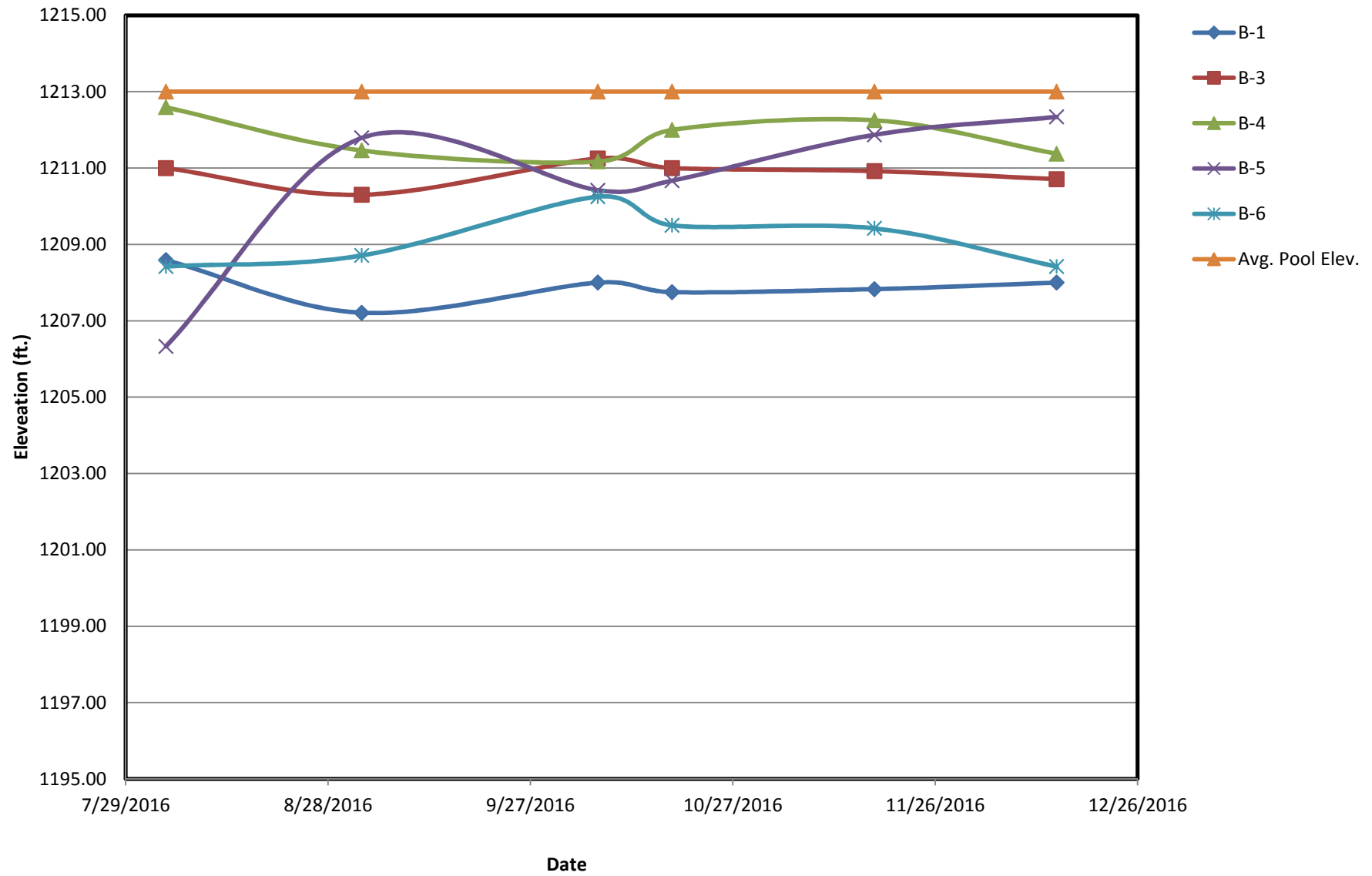
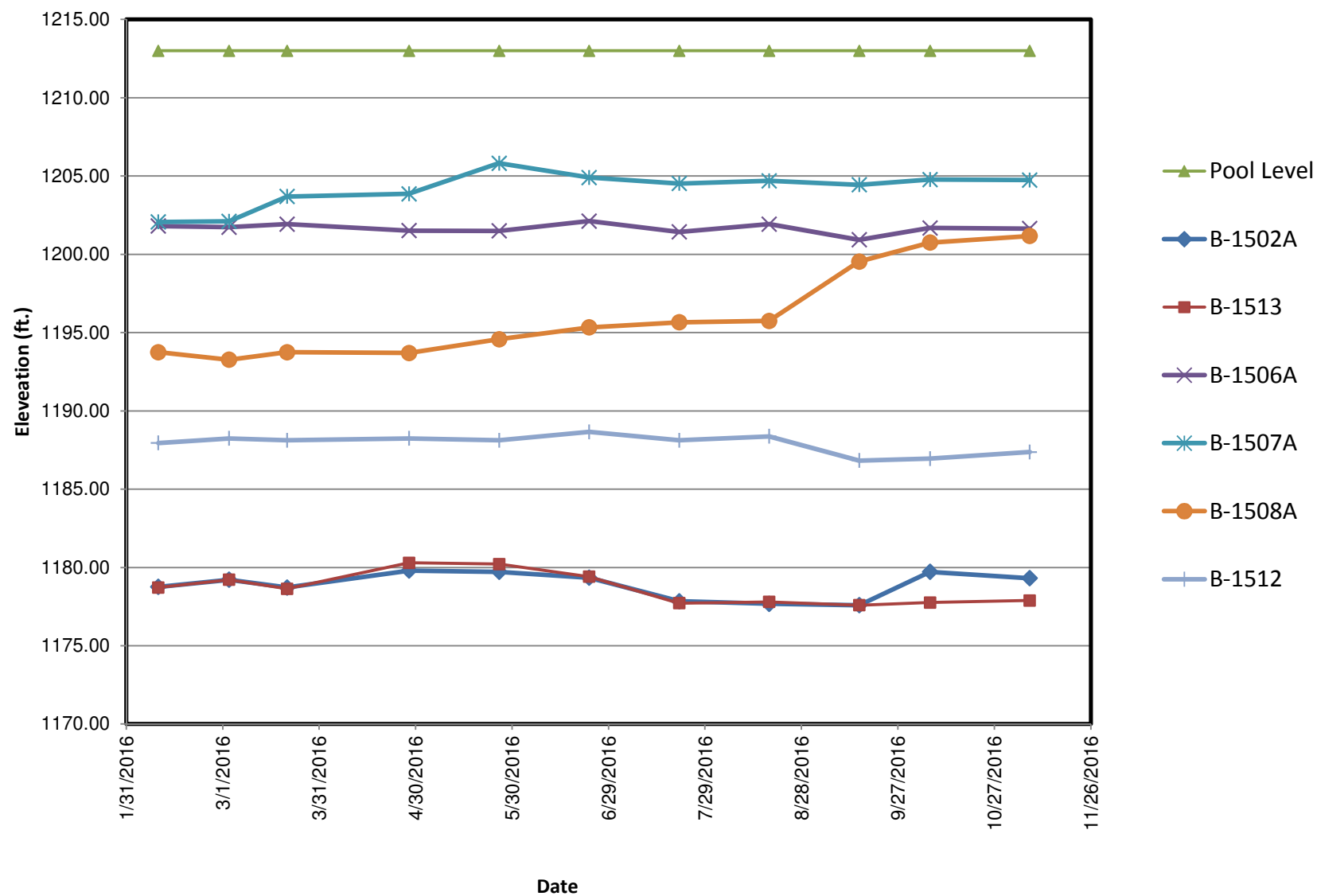
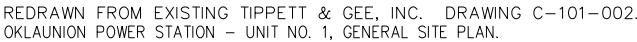


FIGURE - 2
Pond 6 Piezometer Data



APPENDIX A

OKLAUNION CCR POND GENERAL LOCATION MAP AND INSTRUMENTATION LOCATION MAPS



4	GENERAL REVISIONS	2/10/05	JS		
3	GENERAL REVISIONS	5/8/03	JS		
2	GENERAL REVISIONS	5/31/02	TDA		
1	GENERAL REVISIONS	2/14/02	TDA		
REV	DESCRIPTION	DATE	DR	BY	APP

APPENDIX B

OKLAUNION INSPECTION PHOTOGRAPHS

AEP GES

Dam and Dike Inspection

Plant Name:

Observation #:

Unit:

Photo #1

Description:



Notes:

Location:

Photo #2

Description:



Notes:

Location:

Photo #3

Description: Crest



Notes: Typical Crest in Good Condition.

Location: South Dike

Photo #4

Description: Interior Slope



Notes: Typical Interior Slope in Good Condition.

Location: Pond 6 Raised Dike

AEP GES Dam and Dike Inspection

Plant Name:

Observation #:

Unit:

Photo #1

Description:



Notes:

Location:

Photo #2

Description:



Notes:

Location:

Photo #3

Description: Exterior Slope



Notes: East Exterior Slope in Fair Condition. Note that the channel receives run off from surrounding area. Plant to Monitor

Location: Pond 6 East Exterior Slope

Photo #4

Description: Interior Slope



Notes: Typical Interior Slope and Retaining wall in Good Condition

Location: Interior Slope after 2015 Dike Raising

AEP GES

Dam and Dike Inspection

Plant Name: Oklaunion

Observation #: 3

Unit: Pond 21

November 1, 2016 at 10:57 AM

Photo #1

Description: Interior Slope



Notes: Interior Slopes in Good Condition

Location: South of Pond 21. Looking North.

Photo #2

Description: Interior Slope



Notes: Interior Slope in Good Condition

Location: Interior Slope of Pond 21. Looking West

Photo #3

Description: Interior Slope



Notes: Pond 21 Exterior Slope and Interior Slope of Makeup Water Pond

Location: Makeup Water Interior Slope Looking West.

Photo #4

Description: Exterior Slope



Notes: Damage on the Makeup Water Pond Slope. Plan to install rip rap to prevent future Slope failure.

Location: Pond 21 Exterior Slope

AEP GES

Dam and Dike Inspection

Plant Name: Oklaunion

Observation #: 4

Unit: Pond 21

November 1, 2016 at 10:55 AM

Photo #1

Description: Crest



Notes: Crest in Good Condition

Location: Dike between Pond 21 and Pond 22. Looking South

Photo #2

Description: Crest



Notes: Crest in Good Condition

Location: Between Pond 21 and Makeup Water Pond. Looking South.

Photo #3

Description: Other



Notes: Discharge Pipe

Location: East Slope of Pond 21

Photo #4

Description: Other



Notes: Bottom Ash Sluice
Discharge Pipe

Location: South Side of Pond 21

AEP GES

Dam and Dike Inspection

Plant Name: Oklaunion

Observation #: 5

Unit: Pond 22

November 1, 2016 at 10:39 AM

Photo #1

Description: Interior Slope



Notes: Typical Interior Slope in Good Condition.

Location: North Side of Pond 22

Photo #2

Description: Crest



Notes: Typical Crest in Good Condition

Location: Dike between Pond 22 and Pond 23.

Photo #3

Description: Interior Slope



Notes: Typical Interior Slope in Good Condition

Location: West Interior Slope

Photo #4

Description: Other



Notes: Discharge Pipe

Location: South End of Pond

AEP GES Dam and Dike Inspection

Plant Name: Oklaunion

Observation #: 6

Unit: Pond 23

November 1, 2016 at 10:33 AM

Photo #1

Description: Interior Slope



Notes: Interior Slope in Good Condition

Location: South Side Interior Slope

Photo #2

Description: Interior Slope



Notes: Interior Slope in Good Condition

Location: East Interior Slope. Looking North

Photo #3

Description: Interior Slope



Notes: Interior Slope in Good Condition

Location: West Interior Slope. Looking North

Photo #4

Description: Crest



Notes: Typical Crest in Good Condition

Location: Dike between Pond 23 and WWSP

AEP GES

Dam and Dike Inspection

Plant Name: Oklaunion

Observation #: 7

Unit: WWSP

November 1, 2016 at 10:35 AM

Photo #1

Description: Interior Slope



Notes: Interior Slope in Good Condition

Location: South Interior Slope

Photo #2

Description: Interior Slope



Notes: Interior Slope in Good Condition

Location: West Interior Slope Looking South.

Photo #3

Description: Interior Slope



Notes: Interior Slope in Good Condition

Location: North Interior Slope. Looking East

Photo #4

Description: Crest



Notes: Typical Crest in Good Condition

Location: Dike between WWSP and Pond 7